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An inaugural dissertation
On
the Physiology and Pathology of the Stomach.

by

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Diversified as may be the subjects for an inaugural dissertation, none more fairly claim attention, or open a field for more interesting and philosophic enquiry, than the Physiology and pathology of the Stomach. The importance of this organ, its extensive influence over the whole animal oeconomy in health and disease, certainly is a subject well calculated to arrest the speculations of the philosophic and practical physician. If facts form the basis of sound reasoning, we must allow to the stomach a supremacy over all the viscera. It is the most universal of all, and (as a rational deduction) the most indispensably necessary to animal life. Instances of human foetuses born destitute of a brain or heart, or lungs or liver, or some other organ, are familiar, but where will we find one, in which the stomach was found wanting? In some animals indeed, for instance Zoophytes, Hydatids and Polypi, no other animating viscus is discoverable. The Polypus, which is classed in the lowest order of being and considered as forming the connecting link between the animal and vegetable creation, has for a stomach, a simple cavity, into which its food

is received, and from which it is afterwards disgorged. As we rise to the higher classes of animals we find the digestive apparatus becoming more complicated. From a straight tube, it becomes more or less convoluted, its length increased many times that of the body, and having added to it many subsidiary organs for the proper performance of its functions. In fine, the fact of the stomach being an inseparable incident to every grade of animal life, seems beyond the reach of sophistry. All parts of the body, feel its salutary and invigorating influence when in health, and when deranged, all participate in its derangement. "Languido ventriculo, omnia languent."

The anatomy of this organ is most interesting. We find it joined in a circle of nervous communication with all the viscera of the Thorax Abdomen and pelvis, itself forming, as it were, the centre. The eighth pair of nerves, from their extensive distribution commonly denominated the Par vagum, which are the peculiar nerves of the stomach, communicate freely with the sympathetic, and have moreover, connexions almost

as extensive as this great nerve itself— to the oesophagus, pharynx and larynx, to the lungs and vessels of the heart, to the liver, spleen, duodenum &c are distributed branches of the par vagum. The stomach then we see occupying the central situation of a most complicated structure, and maintaining a chain of sympathies more exquisite even than the brain itself. But it is not to the knife of the anatomist that we must look for a discovery of the whole importance of the stomach; it is in the living system where we behold those nice connexions of cause and effect, and those wonderful trains of associative motions, that this fact is fully developed. We here behold it maintaining an intimate relationship with the whole animal machine, invigorating and imparting tone to it when in health, and when disordered, giving origin to a multiplicity of diseases, truly wonderful. Why nature should be thus partial in the exalted station she has given to this organ, we may conjecture from its office of preparing nourishment for the whole system. A desire for food, considered by some as coeval with the rudiments of the foetus, is certainly the first impulse

stimulating to action the new born babe; and among the most wonderful operations of nature, is to be classed that for which the stomach seems designed. That we live in an age remarkable for its advances towards the perfection of Literature and the Arts, examples of every day abundantly testify. Nor is the improvement lately suggested in the Physiology of the Stomach, to be classed among those productions of a speculative genius, which throw an illusory light over the dark and intricate paths of science, that gradually disappearing, leaves the succeeding darkness more visible than before. The process of digestion has at various times been accounted for in various ways. The first theory that enlisted popular opinion, was that which imputed it to a putrefactive process, supposing the food to undergo the same changes in the stomach, that warmth and moisture effect upon it out of the body. The next theory suggested, accounted for this operation on physical principles, or which supposed the muscular coat of the stomach wrought mechanically on the food contained within it. Chemistry was next called [illegible] in to furnish a still more plausible doctrine, and digestion then became

purely chemical. These several doctrines have long since been exploded, and for years past the settled conviction of the most celebrated Physiologists on this point has been; that digestion, so far as the stomach is involved, is performed by the solvent powers of the gastric juice secreted by this organ, thereby converted into what is termed chyme; this chyme, propelled by the stomach into the duodenum, and there combined with the Hepatic and Pancreatic secretions, assumes new characteristics, a portion of it being converted into what is termed chyle; this chyle, taken up by the lacteals of the intestines, is conveyed along to the Thoracic duct, which transmits it finally to the left Subclavian vein. The idea of digestion being performed by a solvent power was first suggested by Cheselden. But upon the experiments of Spallanzani and others, the advocates for this theory exclusively rely. The observations of Hunter, who, in the case of a man suddenly killed after eating a hearty meal, found an erosion in the great end of the stomach, and concluded it was occasioned by the gastric juice, served powerfully to confirm the experiments above alluded to. But this theory, plausible as it may be, will no doubt

be doomed to share the fate of those antecedent to it. In a small work, published lately by Dr Smith, it has been shown to the decided conviction of myself, and indeed many more than myself, (those too, for whose judgement I entertain a high degree of respect) that digestion is not performed by the solvent powers of the gastric juice; that so far from the lacteals absorbing chyle from the small intestines, chyle is not to be found in these latter, but that there is a galvanic or an electro animal principle conveyed by the nerves of the stomach, and made to act upon its contents through the medium of its saline secretions, that the aliment in the stomach thus undergoes an animal decomposition and after being reduced to its elements, is recombined by the principle which controls the composition of animal matter, though probably not endued with vital properties, till it enters the circulation; that a considerable portion of the aliment is absorbed by the capillary veins of the stomach and intestines, and conveyed through the vena portae and the capillary system of the liver, when it undergoes still more important changes; that another portion is taken up by the lacteal absorbents and convert-

ed by them into chyle. In support of this theory the arguments advanced are ingenious and conclusive. The oldest physiological experiment of which we have any account, is the division of the eighth pair of nerves. This experiment has been performed by many of the Ancients and repeated by many modern Physiologists. Among the latter, the experiments of Dr Philip made on this nerve with reference to its effects on the Stomach, are exceedingly interesting and abundantly demonstrate the identity of the nervous influence and galvanism. By these experiments it is shewn, that a division of the eighth pair of nerves at once deprives the stomach of all power to digest food, but that by coating the ends of these nerves with a little tin foil and connecting them by means of a galvanic battery, the process of digestion is at once resumed, and, with due allowance for the difficulty of supplying the fluid in proper proportion, carried on as perfectly as before any division was made. So far then as the identity of the nervous influence and galvanism is concerned, Dr Smith is supported by the advocates for solution by the gastric juice. The essential point of difference, regards the mode of action of the Galvanic

fluid. By one party it is maintained that this peculiar fluid conveyed by the nerves to the stomach, acts merely as a stimulant to this organ, promoting the secretion of the gastric juice: by the other, that it is made to act upon the contents of the stomach, producing an animal decomposition. It would be an unnecessary expenditure of time to recount the arguments by which this new theory is maintained, especially as the work containing them is accessible to any one. Suffice it to say (as well as a superficial perusal will enable me) that the support of ~~this~~ it, is briefly this— as to absorption by the veins of the stomach: similarity of structure presuming similarity of function— the veins of the intestines absorb, and why not those of the stomach? The liver is redeemed from the comparative insignificancy, former views on this subject, necessarily attached to it. Nature moreover is redeemed from the reflection of adapting means inadequate to the performance of the end designed— the Thoracic duct, hitherto considered as the only medium through which nourishment is conveyed into the System, a small and delicate duct, traversing an extent greater than any other duct in the body and exposed to a variety of accidents, is found

to convey only a part and that a small part of this nourishment. X
Upon the whole I think it will be found after a candid and impartial
enquiry, that the doctrine in question is strongly supported by both
reason and analogy, and if not conclusive in the minds of some,
should at least elicit further enquiry.

After this cursory and imperfect glance at the physiology of the
stomach, I will attempt a brief notice of its pathology. Brief it must
be, for the limits to which I am confined will not allow a thorough in-
vestigation. That diseases do originate in the stomach is evident:
first, from their being preceded by symptoms indicative of
gastric distress; secondly, from remedies applied directly to the
stomach removing these diseases; and thirdly, from dissections
proving a morbid derangement of this organ: the last test
however cannot often be resorted to, for it has been remarked
by one of the most distinguished Pathologists of the age, that
organic affections rarely take place in the original seat of a dis-
ease, but in organs remote and which most sympathize with
the part affected: for example, in Dyspepsy, where the stomach
is originally affected, organic derangement will be met with

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in the liver, lungs or brain — parts which must sympathize with the stomach. Before proceeding farther on this part of my subject it may be proper to premise, that to enter into a consideration of the whole catalogue of diseases which from the present improved state of pathology can be nearly demonstrated as originating in the stomach, would be to detail a large proportion of the most serious diseases to which mankind are liable. It will be necessary therefore for me to confine my remarks to a few of the most prominent of these diseases. And first Dyspepsy will claim a few moments consideration. Whether we regard the variety, consequences or connexions of this with other diseases, none are of greater importance. Beginning from simple and apparently unimportant deviations from health, it gradually undermines every power of the system. Its origin can be distinctly traced to causes acting primarily or secondarily on the stomach. It is not my design to enquire what these causes are. Indigestion has been divided into three stages. The first stage is marked by symptoms denoting derangement of the stomach and bowels; as, flatulence, acid-

ity, distention after eating, nausea, general debility, costiveness or diarrhoea alternately, a vitiated secretion of bile &c. The second or the inflammatory stage, is brought on by the constant irritation of crude, indigested matter in the stomach, causing it to take on a low degree of inflammation, and being accompanied with an inflammatory tendency throughout the system, which is apt to shew itself chiefly in those organs most sympathizing with the stomach. The third stage is marked by organic affections in other parts. These will be briefly noticed. From the fact of juxtaposition being a powerful means for the propogation of disease, we are not surprized to find the liver the first part to suffer from any derangement of the stomach. Accordingly in the first stage of indigestion, a more or less vitiated secretion of bile is enumerated among the symptoms. Still farther advanced, in the second stage, there is pain in the epigastrium, gradually extending downward, till finally the right hypochondrium becomes full and tender on pressure. In short, the symptoms now present, plainly indicate inflammation of the liver. This is an important step in the progress of the disorder from

the importance of the organ now affected. It was mentioned while speaking on the physiology of the stomach, that the liver is redeemed from the low rank former views on this subject attached to it, by exalting its functional powers and appointing it an important office in the process of assimilation. We cannot therefore be surprized to find a disease seated in this organ of a serious nature, reacting on the primary disease that produced it, and combining with it still more effectually to prostrate the powers of the System. It is not uncommon in indigestion for a secondary disease to be relieved by another supervening on it. Hence it happens that inflammation of the liver is often relieved by an affections of the lungs supervening. This again is an important step in the progress of the disorder. Dyspeptic Phthisis, as one of the consequences of long neglected indigestion, is of a serious and alarming character. Of the sympathy existing between the stomach and lungs there can be no doubt. The fact of asthmatic attacks occasioned by a foul stomach, and relieved by a removal of this cause, is of itself sufficient to decide the question. We moreover often see a slight derangement of the digestive organs,

produce cough and other pulmonary symptoms. This form of phthisis in an advanced state is attended with symptoms precisely similar to those of genuine tubercular consumption, and examinations post mortem, shew a condition of the lungs much the same as in other forms of phthisis; as a diagnosis however, there is always superadded to the usual symptoms of phthisis, those indicating a deranged state of the digestive apparatus. It may be proper in this place, to add a fact of an interesting nature— that an affection of a part, dependant upon a sympathy between itself and another part, being in the first instance merely a nervous affection, may be relieved by remedies applied directly to the part primarily affected; but if suffered to become of a more permanent nature, and in the same proportion more independant of the original disease, then for its removal, remedies must be applied to the part that is sympathetically affected: for example— in Hepatitis, one of the diagnostic symptoms is a pain extending to the shoulder; there is at first no tenderness in this part, and it looks perfectly natural, without the slightest appearance of inflammation. But if the complaint is

permitted to continue, there will at last be an actual inflammation of the shoulder where the pain is felt, more or less tenderness to the touch, and the arm cannot be moved without producing an aggravation of the pain. So also in the Pleuritis verminosa, proceeding from the irritation of worms in the alimentary canal, it has been found, that those patients ~~laboring~~ under this complaint, to whom anthelmintics were administered and who in consequence passed worms, recovered, the pleuritic symptoms disappearing without any further treatment; while those in whom the disease was allowed to take its course, or who were treated in the ordinary way for pleurisy and who died, upon dissection there were discovered in such, evident traces of inflammation in the Thoracic viscera. The conclusion hence is, that the symptoms of inflammation of the lungs, were produced and kept up by the irritation of worms; those being removed, the symptomatic affection vanished; but when they were suffered to remain, the symptomatic terminated in a genuine inflammation. These facts teach an important lesson in the treatment of many

sympathetic diseases. Reverting now to dyspeptic phthisis, we find that the cause existing not in the apparent seat of the disease but in a distant organ, the means of cure must be applied radically to influence the state of that organ, before any relief can be expected to the pectoral symptoms. But it is only in the commencement of this disease, that a cure can be attempted with prospects of success, for if suffered to approximate in its nature to an original consumption of the lungs, it becomes like that, one of the opprobria medicorum. The connexion of gout with indigestion is now sufficiently ascertained. When a tendency to this disease exists, it may be induced by any cause producing indigestion, and it has been remarked, that a patient subject to gout, enjoys a longer interval between the fits, the more cautious he is to preserve the tone of the digestive organs. Its kindred affection, gravel, is not less frequently an attendant on indigestion. Dr Philip explains the manner in which indigestion produces fits of gravel, by supposing a vitiated state of the diges-

tive process to be productive of a considerable quantity of acid. This acid on entering the circulation is thrown out of the system by the Skin and kidneys, and passing through the kidneys, it there causes a deposition of lithic acid from the urine, this concreting, occasions fits of gravel. Between gout and gravel, there is an evident analogy. Both are alike dependant on a weakened or disordered stomach, and the symptoms of each frequently alternate the one with the other. "Certain habits and peculiar modes of living, the sedentary occupations of the studious, the indulgencies of the voluptuous or the excesses of the still more intemperate and debauched are found alike to be sources of gout and gravel. However involved in obscurity the origin of these diseases may be, I am persuaded that the first link of the series of actions that cause these two formidable maladies, the scourge of our nature and in some degree, reproach of our art, has its commencement in the stomach." M.D. Chapman. Of all the sympathetic affections of distant parts in indigestion, none are so frequent as those of the head. One of the most common of

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the symptoms of the first stage of indigestion is a head ache. This at first light and inconstant, often becomes at a later period, fixed and violent. Nervous affections of the head, as would appear from its functions, assume a more formidable aspect than those of other parts of the body connected with a depraved stomach. Apoplexy affords a leading example. This disease, pathologists have divided into two varieties – the gastric and cerebral, according to the location of the cause either in the stomach or brain, though it has been contended lately that this disease, in every instance proceeds from some affection of the stomach. We very frequently in those predisposed to it, find it the result of debauchery and excess. Though an attack of apoplexy may be remedied by the adoption of prompt and decisive measures, yet, as being often immediately fatal, it is a most formidable complaint. The immediate connexion of hydrocephalus internus with the state of the stomach, though long unknown to physicians, is now admitted by the best pathologists. It is not pretended ~~to say~~ that this disease always proceeds from causes acting on the stomach; in many instances it evidently arises from causes acting imme-

diately on the brain. We are informed however, that even when it does arise from other causes than those acting on the digestive organs, their tendency to produce it, will be greater or less according to the state of these organs; and that in all cases, preserving a proper state of the digestive organs, is the best means of prevention. I might proceed enumerating other nervous and inflammatory affections connected with indigestion, but enough has been said to demonstrate it a disease of no common interest, involving, as it does, an organ so intimately connected with life and health. Indeed there can be no doubt, that Indigestion in different states and conditions, often gives rise to such an almost inconceivable variety of anomalous symptoms, as to ape nearly every other disease.

The pathology of the stomach as concerned in fever, will next claim our observation. Various have been the theories entertained with regard to the operation of causes in the production of fever, at different periods in the history of medicine. And even in this enlightened day, medical opinion is much divided. The views entertained by our Professor of the theory and practice

of medicine, have a degree of plausibility that entitles them to our credence. The doctrine he has hitherto inculcated on this subject is; that, fever is a disease of sympathy, having for the most part the first link of its ultimately lengthened and complex chain in the stomach. Marsh miasma, one of the most prolific sources of fever, can with much appearance of truth and certainty, be traced as having its primary action on the stomach. What are the symptoms preceding an attack of fever, but such as plainly indicate more or less gastric distress: and where are our remedies principally directed but to the stomach and through it to the system at large: In yellow fever, which is esteemed by many as nothing more nor less than an aggravated form of the common bilious fever, produced by similar causes, only in a higher degree of concentration, and favored in their operation by accidental circumstances, what are the most alarming symptoms but such as decidedly prove inflammation of the stomach: Finally, what have dissections proved in this disease: has not the stomach been found to exhibit the most satisfactory

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signs of inflammation. The black vomit, one of the most alarming of the symptoms of yellow fever is represented by Dr. Bancroft as nothing less than extravasated blood, the effect of the most violent inflammatory action. Admitting that fevers are sympathetic, having their origin in local irritation, we are, I think authorized to infer that it is most commonly the stomach to which this irritation is applied; there, from its central situation and extensive sympathies, the morbid action when once excited, gradually diffuses itself, involving finally the whole system. The sympathy existing between the stomach and skin is very remarkable. It has been ascertained that wounds attended with a disordered state of the stomach have proved altogether intractable and completely baffled the skill of the surgeon, but which yielded readily as soon as the state of the stomach was attended to and a due performance of its functions restored. The whole of the exanthemata, exhibit such satisfactory evidence of gastric origin, that to enter into any detail on this point, would be superfluous. A simple reference to the symptoms, phenomena on dissection and mode of cure of these

diseases will suffice. They commence always with much disorder of the stomach, which is mitigated or entirely removed by the appearance of the eruption, and if from any exposure this eruption should suffer a sudden recession from the surface, a deadly sickness uniformly reverts. In those cases where it is susceptible of demonstration that the stomach is primarily affected, the same symptoms occur: as when from having eaten poisonous food the stomach becomes disordered, an eruption on the surface affords instant relief. Dissections shew in the exanthemata where no eruption had occurred, the mucous coat of the intestines marked with a species of erysipelatous inflammation; and such cases, (no relief being afforded by the cutaneous eruption) are always of a malignant nature. Dr Chapman observes that the feature of malignancy in disease is under all circumstances, derived from the stomach. By opposite states of this organ only, can the difference between the natural and inoculated small pox be accounted for. In the first form of the disease, the stomach is primarily affected by the direct application of the virulous matter to it, and

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hence the violent symptoms of casual small pox are produced. But in the inoculated form, the matter is applied to a portion of the skin, the sympathies of which, are comparatively weak, and in consequence the symptoms following are of a milder nature. I have thus enumerated a few of those diseases whose origin in the stomach admits of very little doubt. Many more might be added, for instance many of the neurose affections particularly Epilepsy, Asthma and many others. But enough I hope has been said to demonstrate the relative importance of the stomach, and shew it to be a chief medium for the application of remedies in the removal of disease.—